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Estimating Commercial Expansion from Irrigation Development in the Oahe Unit

John E. Thompson

ESTIMATING COMMERCIAL EXPANSION FROM IRRIGATION DEVELOPMENT IN THE OAHE UNIT

by

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ESTIMATING COMMERCIAL EXPANSION FROM IRRIGATION DEVELOPMENT IN THE OAHE UNIT

By
John Eldon Thompson

This thesis is approved as a creditable independent investigation by a candidate for the degree, Master of Science, and acceptable as meeting the thesis requirements for this degree, but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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This study was undertaken as part of the work carried on under a Cooperative Contract I79r-2283 Supplement Number 10, between the Bureau of Reclamation and South Dakota State College. The Economics and Repayment Section, Bureau of Reclamation District Office, Huron, South Dakota, and the Agricultural Economics Department, South Dakota State College, were the two departments responsible for carrying on the work outlined under the above mentioned cooperative agreement.

Extensive use was made of data gathered by the Business Research Bureau, School of Business Administration, University of South Dakota, in cooperation with the Bureau of Reclamation, relative to the commercial economy of the Oahe Unit in 1950. Appreciation is expressed for the use of this material.

V. E. Montgomery and R. M. Norman, Business Research Bureau, offered many valuable suggestions connected with gathering and reporting the basic data.

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Economic justification is a major factor to be considered in deciding whether an irrigation project should be authorized. A common technique used in determining economic justification is to compare the benefits and costs of development. The benefits are of two types, direct and indirect. The direct benefits of irrigation are defined by the Bureau of Reclamation as the value of the increase in agricultural production or of the decrease in agricultural operating costs resulting from the project. 1/ The indirect benefits are defined as the benefits that accrue to the secondary activities stemming from or induced by the project, such as the industries that process, distribute, or consume the products of the project and such as the activities that supply the project area with goods and services. 2/

Direct benefits and costs to farmers are measured by the development and expansion of farm budgets for the area under study. Indirect benefits also need to be taken into consideration in order that a more complete evaluation can be made.

An important part of such indirect benefits accrues to business enterprises of the proposed area in the form of stimulated business activity. Thus an estimate of the extent of such business expansion is necessary in order to evaluate the benefits derived therefrom.

1/ Economic Evaluation of Federal Water Resource Development Projects, Report to the Committee on Public Works, House of Representatives, from the Subcommittee to Study Civil Works, Eighty-second Congress, Second Session, December 5, 1952, p. 9.

2/ Ibid., p. 14.

CHAPTER I

INTRODUCTION

Commercial activity in an economy that is predominantly agricultural is very sensitive to changes in farming conditions. It is generally agreed by businessmen in agricultural areas that the success of their business operation is largely dependent upon the number and prosperity of farmers in their trade areas. For this reason businessmen often encourage proposals to increase the number of farms in their trade areas and support measures designed to improve the economic position of farmers.

In South Dakota, where rainfall is considered a limiting factor in agricultural production, considerable interest has been taken in irrigation as a means for increasing farm income. One of the largest proposed areas for irrigation in this state is the Oahe Irrigation Unit located in the east central section. With the development of this unit one could expect the agricultural economy to expand. Consequently, the commercial economy within and near the area would also be stimulated.

In this study an attempt is made to estimate the extent of such business expansion from the development of the Oahe Unit. The major portion of the report deals with the methods used in arriving at such estimates.

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2/ Ibid., p. 14.

B. The Purpose

The objective of this study is to estimate the commercial expansion that may be expected as a result of irrigation development of the Oahe Unit.

Commercial expansion as a consequence of irrigation is limited in this report to estimates of the effect that such development might have on the dollar volume of selected types of retail, wholesale, industrial, and service establishments.

This objective was pursued under a cooperative agreement between the Bureau of Reclamation and South Dakota State College. The Economics and Repayment Section of the Bureau of Reclamation District Office, Huron, South Dakota, and the Agricultural Economics Department of South Dakota State College were responsible for carrying on the work.

C. Review of Literature

Studies attempting to determine commercial expansion from irrigation, or from any other type of economic development, are few in number. Most of the studies are historical in nature, showing what has happened rather than what is apt to occur from development. Furthermore, many of the historical studies do not attempt to separate and evaluate the effects that the various factors contributing towards an economic change have had on the development.

Through the use of multipliers some progress has been made in the direction of predicting selected economic changes arising from particular developments in such fields as population, income, employment, and foreign trade.

A historical analysis of indirect benefits resulting from irrigation development has been made and presented in a report by M. E. Marts. His study of the Payette Area measures the benefits in terms of net income. Marts compares direct benefits with indirect benefits. In the direct he includes benefits from net farm income, government payments to farmers, and farm wages, while in the indirect he takes into account benefits from off-farm entrepreneurial income, labor income and property income. From such a comparison he concludes that for every $1.00 of net income accruing to the farm segment of the local population, the non-farm population realizes $1.27. 3/

A significant difference between the Payette Area and the Oahe Area is that before irrigation development of the Payette Area there was virtually no population other than a few people engaged in railroad and highway maintenance, while in the Oahe Area a well established agricultural economy is already in existence.

F. K. Harmston, College of Commerce and Industry, University of Wyoming, has prepared an unpublished report in which he presents a formula that may be used to show the multiplying effect that additional income brought into an area might have on expenditures induced by such an increase in income. 4/

3/ Marts, M. E., An Experiment in the Measurement of the Indirect Benefits of Irrigation, Payette, Idaho, A Report for Regional, Bureau of Reclamation, United States Department of Interior, Boise, Idaho, 1950, p. 38.

4/ Harmston, F. K., "Use of the Multiplier as a Measure of Indirect Benefit From Natural Resource Development," Proceedings of the Second Annual Conference on Resource-Development Benefits, Rural Sociology Department, South Dakota State College, Brookings, South Dakota, April, 1953, pp. 13-22.

Harmston states that "Usefulness of the multiplier as a measure of the indirect benefits from natural resource development is dependent upon continued research, since it, in itself, is a static measure. The use of models based upon growth studies of various communities could be very helpful in making application under dynamic conditions possible." 5/

Alexander Joss, while working with the Bureau of Agricultural Economics, prepared a short article in which he pointed out some broad relationships from data pertaining to 11 Western states, between number of farms and population. One interesting relationship was that for each new farm developed an increase of 9.75 persons might be expected. This multiplying factor was obtained by considering and expanding relationships between existing farms and employed workers in agriculture, from employed workers in agriculture to workers in service occupations, and from total employed workers to total population. 6/

Montana State College Agricultural Experiment Station in cooperation with the Bureau of Reclamation has also done work along the line of attempting to trace the income flow through an economy to show the multiplying effect in the processing and distribution of resources.

An inventory report of the commercial economy in the Oahe Area in 1949 was published by the Business Research Bureau, University of South Dakota, as preliminary material for this study. 7/

5/ Ibid., p. 20.

6/ Joss, Alexander, "Relation of Irrigation to Population," Rural Sociology Volume 11, No. 1, March, 1946. pp. 52-55.

7/ Thompson, John, Commercial Economy of the Oahe Area 1949, Prepared at the Business Research Bureau, University of South Dakota, in cooperation with the Bureau of Reclamation, Department of Interior, 1952.

CHAPTER II

THE OAHE AREA

A. Description of the Area

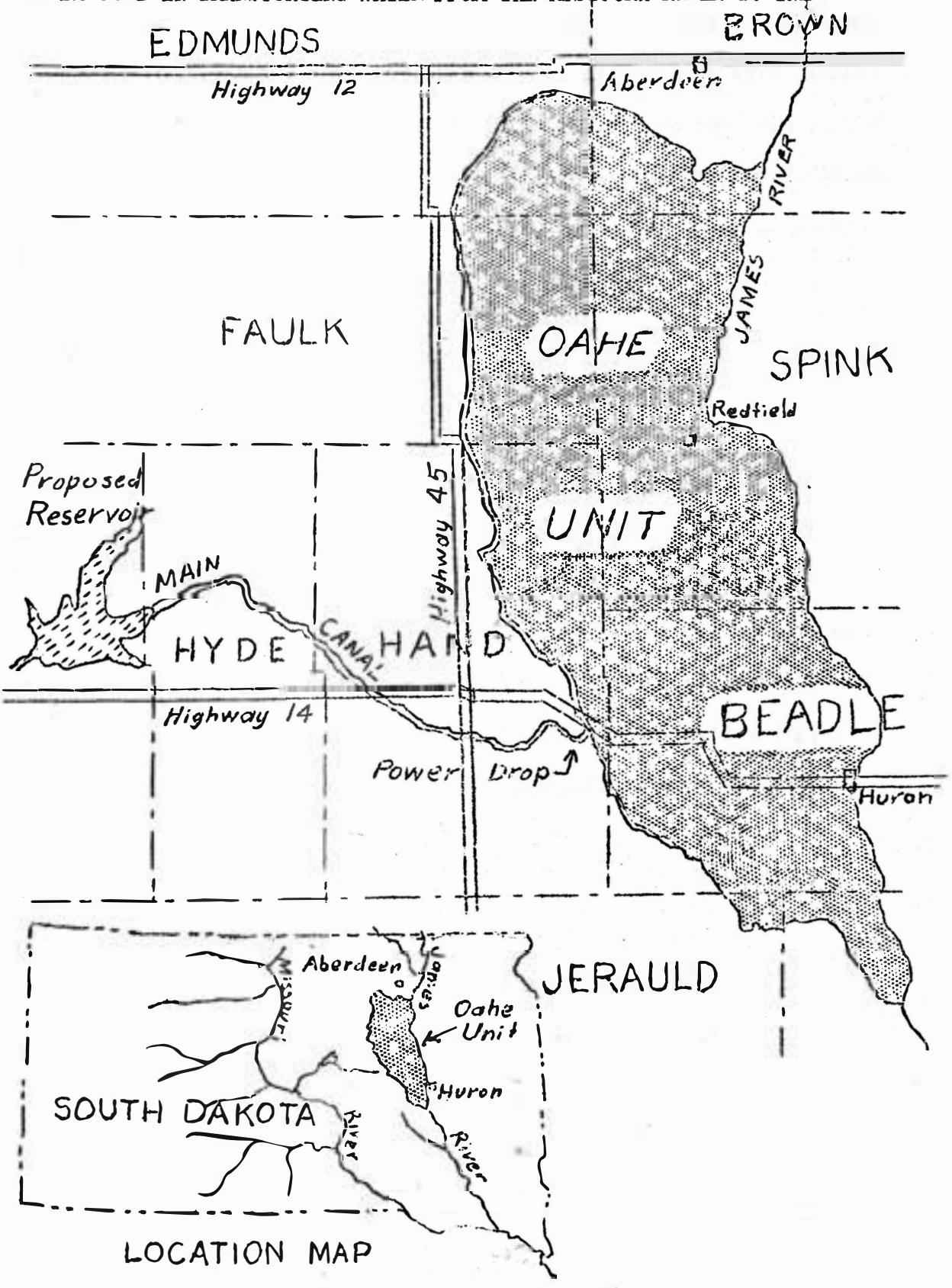
The Oahe Irrigation Unit is an area of approximately 1,742,000 acres. The eastern boundary of this unit is the James River and the western boundary lies along South Dakota Highway 45. The area extends north to U. S. Highway 12 and south to South Dakota Highway 34. It is approximately 30 miles wide and 90 miles long (See Oahe Area Map, page 7). The Oahe Unit lies in a relatively level, dry sub-humid region, having a high percentage of tillable soil.

The economy of this area in 1950 was predominantly agricultural, with special emphasis on grain farming and raising of beef cattle. Wheat, oats, barley, rye, corn, flax, sorghums, and hays were the important crops, with cattle, sheep and hogs the main types of livestock raised.

The average growing season is from 130 to 140 days per year. However, the length of season varies considerably as does the temperature. The average rainfall for the counties of the Oahe Area ranges from 18 to 22 inches annually.

There were 39 urban settlements within or near the unit in 1949. The population of 32 of these settlements ranged from six persons to less than 1,000. Four of the towns were between 1,000 - 2,000 and the three largest trade centers of the area, Redfield, Huron and Aberdeen had

FIGURE 1. LOCATION OF THE PROPOSED OAHE IRRIGATION UNIT AND CANALS TO BE USED IN TRANSPORTING WATER FROM THE MISSOURI RIVER TO THE UNIT



2,655; 12,788; and 21,051 inhabitants respectively. 8/

The business establishments of the urban centers were predominantly retail in type catering mainly to customers connected with agricultural production. Fifteen hundred and twenty-five firms were included in the enumeration. The full time employees of these firms numbered 7,810 and part time 1,328. The volume of business transacted by types of firms is included in Table I, Appendix A, page 47.

B. Determining Justification of Irrigation in the Oahe Unit

During the early stages of investigation of the possibilities of irrigation in the Oahe Area, it was estimated that approximately 750,000 acres might be irrigated. This proposal created a need for several studies to determine the physical limitations and economic justification of such a development. Studies dealing with soils, water, climate and topography were undertaken to determine the physical desirability, and economic studies relating to benefits and costs of irrigation in this unit were made to determine the economic justification of the project.

8/ See Table I, page 22, for population of towns in the Oahe Area.

CHAPTER III

BASIC DATA AND ASSUMPTIONS

A. Basic Data

The procedure used in estimating the impact irrigation might have upon the commercial activity in the Oahe area, was to compare the business economy of that area under pre-irrigation conditions with what might be expected in that same area if irrigation development were complete.

The pre-irrigation commercial economy in 1950 was analyzed from data gathered from managers or employees of firms in operation at that time. The data gathered relative to each establishment included type and location of firm, number of employees, type of goods handled or services performed, type and adequacy of transportation used, volume of business, and an estimate of each firm's trade area. 9/

The basic data were obtained through personal interviews of more than 1,500 individual business managers or employees in approximately 40 trade centers of the Oahe Area. 10/ These data were then tabulated, analyzed and prepared in a summary report in 1952. 11/

From the analysis of the gathered information it was possible to determine several relationships. Some of the most useful are the relationships between population of trade areas and number and types

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9/ See Appendix B, pp. 52-53 for samples of schedules used.
10/ See Appendix A, pp. 48-50 for typical types of businesses contacted.
11/ Thompson, John, op. cit.

of business firms; population of trade areas and dollar volume of business transacted; between employment and size and type of firm; and between population of towns and number and type of firms in those towns. Census data were used in making similar relationships for the Oahe Area, for selected regions or states and for the total United States.

Other useful data were the estimates made of the future number and location of farms and processing plants resulting from irrigation development in the Oahe Unit. These estimates were prepared by the Economics and Repayment Section, Bureau of Reclamation District Office, Huron, South Dakota.

B. Assumptions

In this study an attempt is made to estimate commercial expansion mainly from the anticipated population increase in the area due to irrigation. Several other dynamic economic factors influencing future business activity such as the amount of per capita expendable income, the spending patterns of customers, efficiency of operation by businessmen, average size of family, and the size of trade areas are all held constant while the increase in population due to irrigation is estimated.

From the estimate of population increase it was possible to approximate the additional income that may be expected from the proposed development. Future dollar volume estimates were computed on the basis of 1950 price levels.

After an approximation of the future business activity has been made, based upon the estimated increases in population density and income, adjustment to these approximations can be made if necessary in accordance with the impact that irrigation may have on the factors mentioned above.

It must be emphasized that these assumptions are not necessarily made with the belief that such conditions are apt to occur. Rather they are made as a facilitating measure in dealing with the problem of estimating the increase in population and commercial expansion.

CHAPTER IV

ESTIMATING INCREASE IN POPULATION FROM IRRIGATION BY THE TRADE AREA RATIO FORMULA

The procedure used in determining commercial expansion from irrigation development was to estimate the rural and urban increase in population in trade areas of all shopping centers of the Oahe Area and then total the effect of such population estimates on the commercial economy of the urban centers.

In this study the definition of urban population was considered to be the number of inhabitants in each urban settlement regardless of its size. The remaining population in the area was considered rural.

An increase in rural population is expected to result as more farm families are needed to operate more numerous farms being established as a result of irrigation.

The rural increase in population was determined by multiplying the average size farm family in South Dakota in 1950, by the additional farm families expected after development. 12/

The number and location of additional farms that might be expected as a result of irrigation was derived from farm development studies. In these studies farm budgeting factors were used in determining size, location, and type of farming enterprise to be undertaken. Such factors

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12/ The average number of persons per farm family in South Dakota (3.8) was determined by dividing rural farm population in 1950 by number of farms in South Dakota in 1950.

would include classes and location of land and the percentage of land that was considered irrigable. A significant change in any of the above factors would of course affect the estimated number of farms and consequently alter the resulting estimates of population and commercial expansion. 13/

To determine the effect of the rural growth on the commercial economy it was necessary to consider how the increase in rural population would be distributed in relation to the shopping centers. The amount of increase in rural population in the trade area or areas of a selected town will, as is explained below, be the main factor in determining the increase in urban population. 14/

Total increase in rural and urban population in the trade areas of selected towns was used in determining commercial expansion in each shopping center.

A. Delineation of Trade Areas

Total rural population for the Oahe Area or for selected towns of this area can best be determined after a boundary or boundaries have been established within which rural population, actual or estimated, can be counted.

Trade areas were thus delineated for each town included in the

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13/ As was stated above, the number of farms after irrigation development and their location were estimated by the Economics and Repayment Section, Bureau of Reclamation District Office, Huron, South Dakota.

14/ The effect that the creation of new or additional types of processing plants may have on number of urban inhabitants was also considered.

Oahe Irrigation Area. 15/

The delineation of trade areas for each town served as a guide for determining number of customers for each town. Trade areas were delineated for each urban center in accordance with the types of establishments and pattern of operation of firms in the selected centers.

Each business establishment was classified into one of three broad groups: primary, secondary, or industrial-wholesale, with trade areas delineated for each of these groups. The main reason for classifying each establishment into a particular group was to determine the type of trade area or areas that each shopping center was serving, and to compute rural to urban population ratios from the number of inhabitants located in the delineated rural and urban areas.

The types of business firms that constitute the primary group are establishments handling convenience goods or performing necessary services which can usually be obtained at relatively low and standardized prices. These goods or services are usually available near the home or near the place of employment of the consumer. Typical stores placed in this primary group were grocery, drug, cigar, and liquor stores, meat markets, restaurants, barber and beauty shops.

The secondary trade area group was established from businesses that handled shopping goods or luxury items, or performed services of a specialized nature. Customers often attach great importance to

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15/ Towns of the Oahe Area include those within the Unit boundary and only those outside. that are near enough to the proposed irrigation areas to be directly affected by the development. See Table I, p. 22, for towns included in this study.

these goods and services thus price and quality are important factors. Principal stores in this group are apparel stores, building material stores, sporting goods stores, hatcheries, dairies, livestock auctions, grain elevators, and financial establishments.

The industrial-wholesale trade areas were delineated as a result of industrial and wholesale business activity. Many of these firms had established out-of-city truck routes to deliver their merchandise. Specific types of establishments included in the industrial-wholesale group were aircraft dealers, construction machinery and heavy machinery dealers, trailer house dealers, music stores, and taxidermy services. 16/ The trade areas were then determined on the basis of these three different groups. (See Figures 2, 3 and 4, pages 16 - 18.)

The trade area boundaries for each town included in this study were established at what might be called the 50 per cent patronage-breaking-point boundary. Those living within this boundary line were assumed to patronize selected businesses within the trade center 50 per cent or more of the time while those living beyond the boundary line shopped in some other town a majority of the time.

Information obtained from businessmen pertaining to their trade area was of little value in establishing trade area boundaries. Many were aware of the outer limits of their trade area but were uncertain as to where the 50 per cent breaking-point boundary might be located.

16/ See Table II in Appendix A, pp. 48-50 for the types of firms typically classified into the primary, secondary, and industrial-wholesale groups. Exceptions in classification were made if a firm's operations were more characteristic of the conditions of one of the other groups.

FIGURE 2. PRIMARY TRADE AREAS FOR SHOPPING CENTERS OF THE OAHE IRRIGATION AREA, 1949

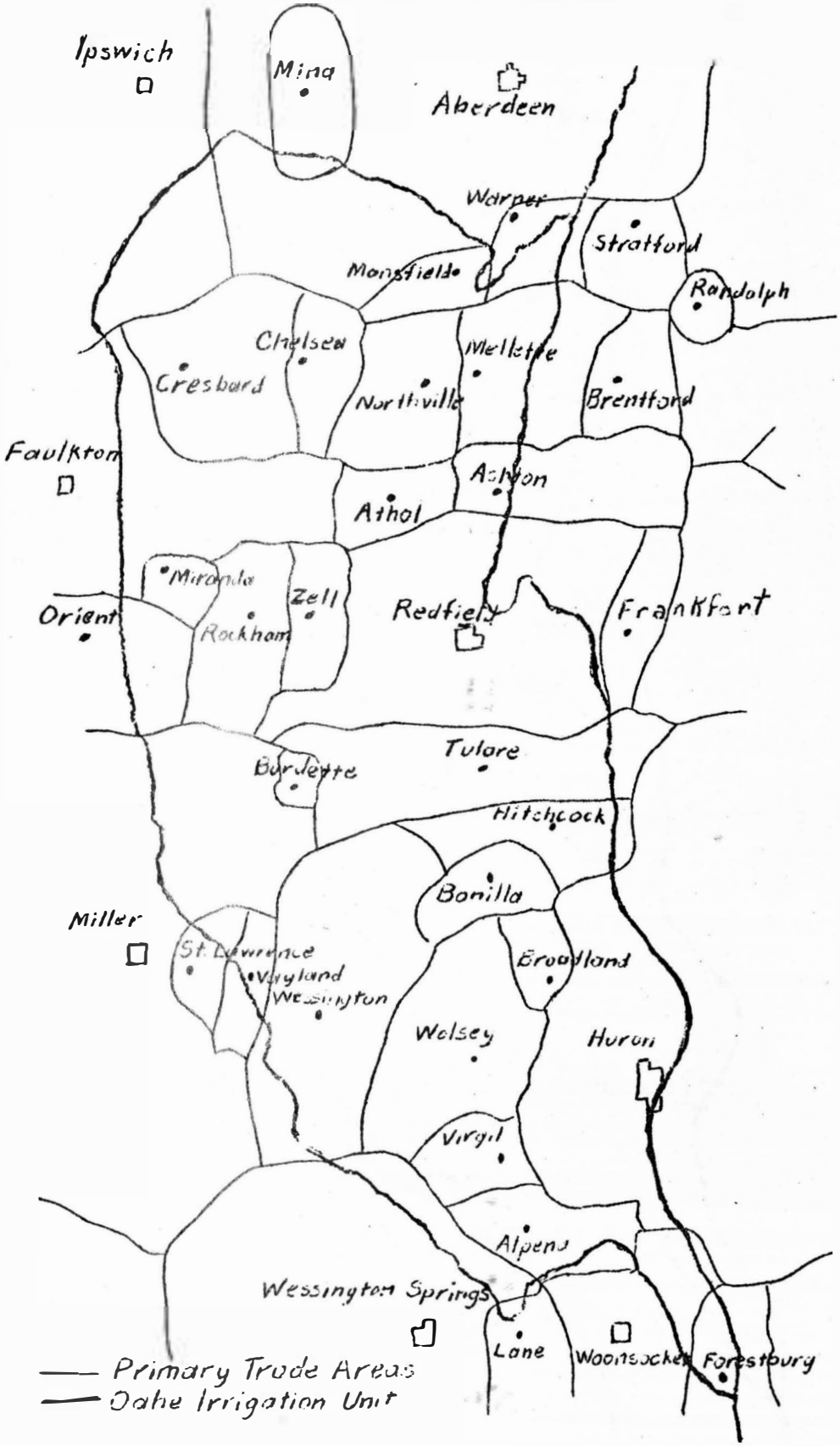


FIGURE 3. SECONDARY TRADE AREAS FOR TOWNS OF THE OAHE IRRIGATION AREA, 1949

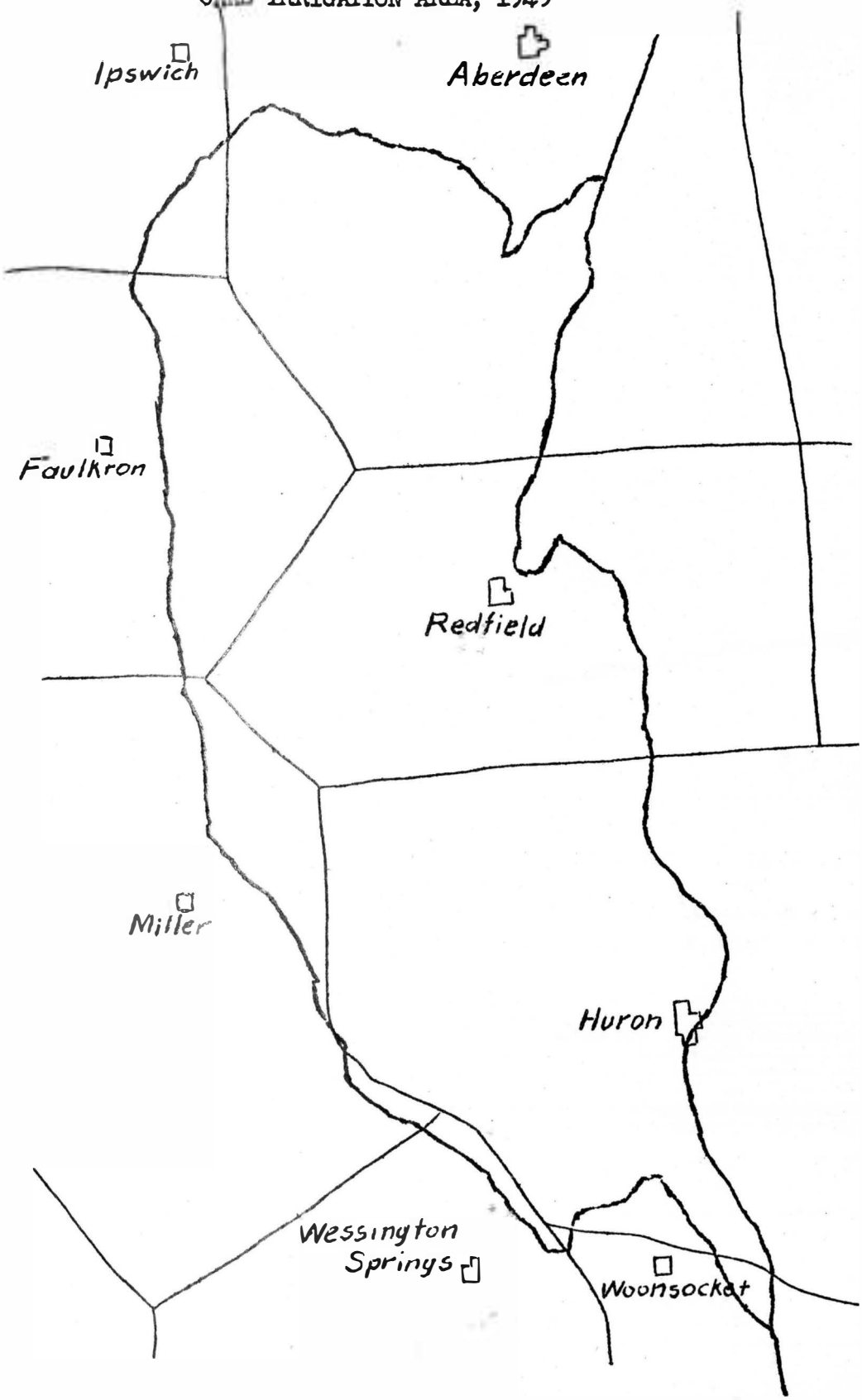
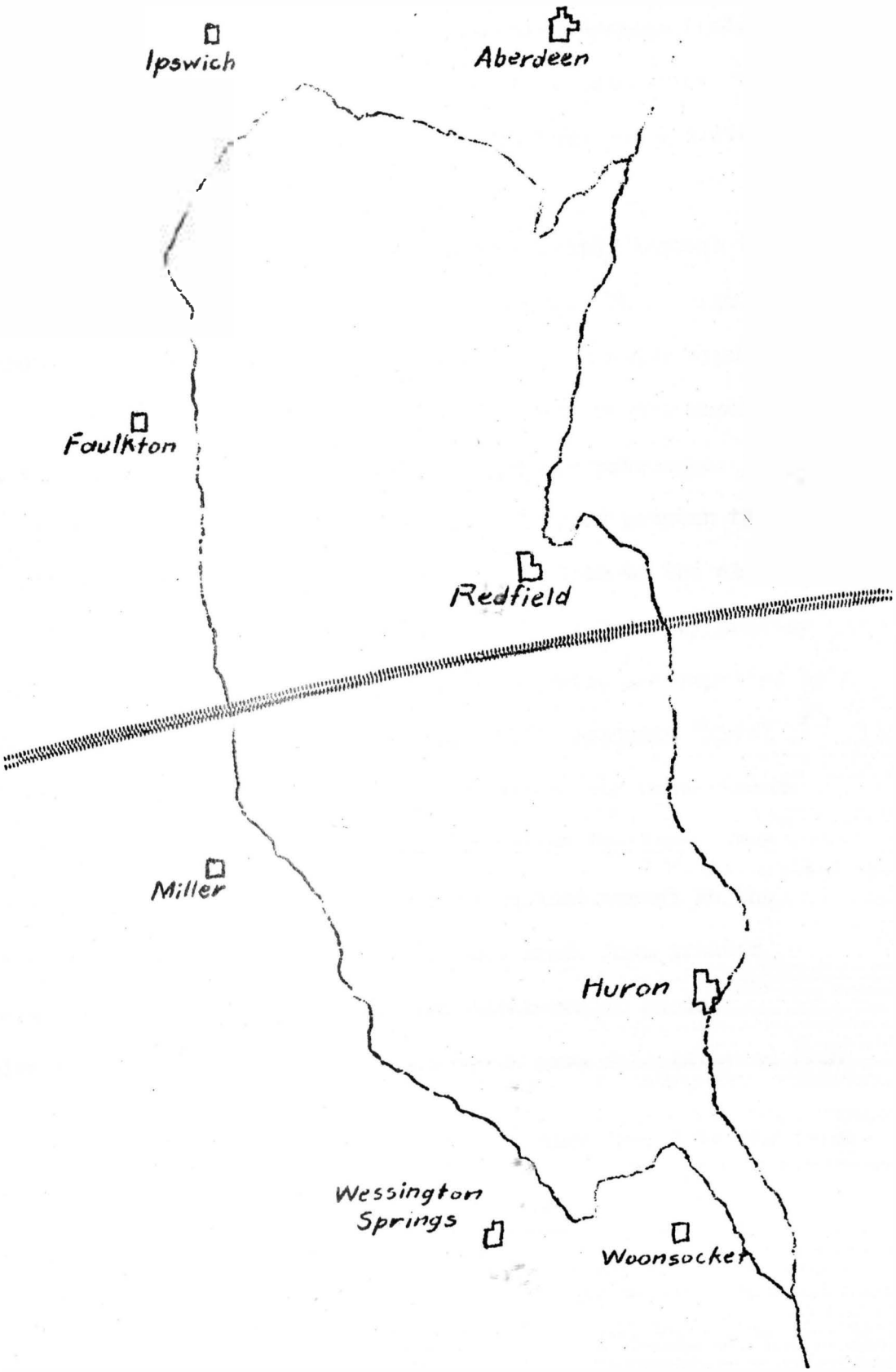


FIGURE 4. INDUSTRIAL-WHOLESALE BOUNDARY DIVISION BETWEEN ABERDEEN AND HURON IN RELATION TO THE OAHE UNIT, 1949



Proprietors often thought of trade areas in terms of the location of many of their more distant customers rather than a boundary beyond which some other trade center had more customer-patronage influence. The outer limits of a trade area are important in many cases, but in determining the breaking-point between cities these outer limits are not too significant.

Breaking-point boundaries were delineated mainly through the use of a statistical equation called Reilly's formula. This formula is based upon "Reilly's Law of Retail Gravitation," in which population of shopping centers and distance to trade centers are the controlling factors in determining extent of trade or customer patronage. 17/ The formula is derived from the theory that retail trade between two cities will be attracted approximately in direct proportion to the distance from each town. Consumers are attracted to larger towns by greater assortments of merchandise, services and amusements, and repelled by the longer trips necessary to reach them. Also consumers travel further to buy high-priced than low-priced goods; and upper-income families travel farther to shop than lower-income families. For this reason, a town offering high-priced goods, that appeal to the upper-income families, may expect to attract trade from greater distances than a town whose stores carry lower-priced goods.

Also taken into consideration were trade area data gathered from

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17/ If A is one town and B another, the distance from B to the trade area boundary is determined from formula

$$\frac{\text{Distance from A to B}}{1 + \sqrt{\frac{\text{Population of A}}{\text{Population of B}}}}$$

those living in or near the area and factors such as business attractions to the city, transportation facilities, and topographical conditions.

An important limitation in the delineation of trade areas is that no one trade area boundary can be established which will include all customers patronizing and exclude all those not supporting a given town. Overlapping will generally, if not always, occur.

After trade areas for each town were delineated it was possible to determine the approximate rural population in each town's trade area by counting population from minor civil division Census estimates. The rural population for the primary trade area of a town, for example, would be the number of people living beyond the town limits but within the plotted primary trade area boundary. The rural population of the secondary trade area would be those living in the area located between the city limits and the secondary trade area boundary, while the number of persons living outside of the city limits and inside of the industrial-wholesale trade area boundaries would be the rural population of the industrial-wholesale trade area. The total trade area population would include both rural and urban inhabitants residing within the boundary of each delineated trade area. 18/

All shopping centers in the area have a primary trade area, but all do not have secondary or industrial-wholesale areas. If a town did not have business firms classified in either the secondary or industrial-wholesale group neither secondary nor industrial-wholesale trade areas were delineated for it.

18/ See Table I, p. 22, for population of trade areas of all towns in the Oahe Area.

An assumption was made that the location of each town's trade area boundary would not change because of irrigation. It is realized that this may not actually be the case, as irrigation development usually will affect the trade area of a town. However, by not shifting trade area boundaries, while applying the method, one can estimate the effect of irrigation development upon the business life of the whole area more accurately. After this is done trade area boundaries may be altered through a process of allocating total commercial growth to individual towns.

The total trade area population would include the rural and urban inhabitants within the boundary of each delineated trade area. The following table shows the approximate number of people living in each area.

TABLE I. POPULATION OF THE PRIMARY, SECONDARY AND INDUSTRIAL-WHOLESALE TRADE AREAS BY TOWNS IN THE OAHE IRRIGATION AREA, 1949

Town	Town Population (1949)	Trade Areas		
		Primary	Secondary	Industrial-Wholesale
Total	48,093	72,373	80,475	120,000
Aberdeen	21,051	25,251	34,000	75,000
Huron	12,788	15,488	21,500	45,000
Redfield	2,655	3,755	6,375	
Miller	1,916	4,186	5,200	
Wes. Springs	1,453	3,903	4,500	
Ipswich	1,058	2,316	3,000	
Woonsocket	1,051	2,414	2,650	
Faulkton	837	1,915	3,250	
Wessington	467	1,392		
Alpena	426	778		
Wolsey	391	1,010		
Frankfort	331	511		
St. Lawrence	261	401		
Mellette	250	685		
Cresbard	235	628		
Hitchcock	227	707		
Ashton	222	522		
Northville	220	620		
Tulare	212	890		
Orient	206	634		
Stratford	164	304		
Warner	150	390		
Zell	150	210		
Forestburg	150	410		
Mansfield	150	280		
Lane	145	305		
Brentford	132	356		
Bonilla	125	223		
Virgil	124	340		
Rockham	113	429		
Vayland	108	140		
Athol	87	263		
Broadland	74	138		
Miranda	73	128		
Chelsea	41	166		
Mina	29	129		
Burdette	8	60		
Norbeck	7	48		
Wecota	6	48		

Duxbury and Hiway Stations excluded.

B. Development of the Trade Area Ratio Formula

When the pre-irrigation rural population in each town's trade area or areas was determined, rural to urban population ratios were computed. A weighted average of these ratios, weighted in accordance to the population of each town in the area, was calculated for the primary, secondary, and industrial-wholesale trade area groupings.

Such ratios, when applied to the estimated increase in rural population, can furnish an estimate of the additional urban population that can be expected to be needed to serve the expanded numbers in rural areas.

In computing the rural to urban average weighted ratio for the primary group only the towns with a delineated primary trade area were used as a basis for the ratio calculation.

The towns having secondary and industrial-wholesale trade areas were excluded because the population of these towns was assumed to be greater than was actually needed to serve the population of their primary trade areas. A portion of the urban population of such towns was so established because of services demanded by the population in trade areas other than their primary trade areas. Thus, because of the difficulty of determining what part of the urban population of these towns would be necessary to serve only their primary areas, towns having secondary and industrial-wholesale trade areas were not included in computing the average weighted rural to urban population ratio for the primary group.

For similar reasons the secondary rural to urban population ratio

was computed only from data relative to those towns having both primary and secondary trade areas. Towns having industrial-wholesale areas again were excluded because of the problem of determining the number of persons in these towns serving the industrial-wholesale rural population.

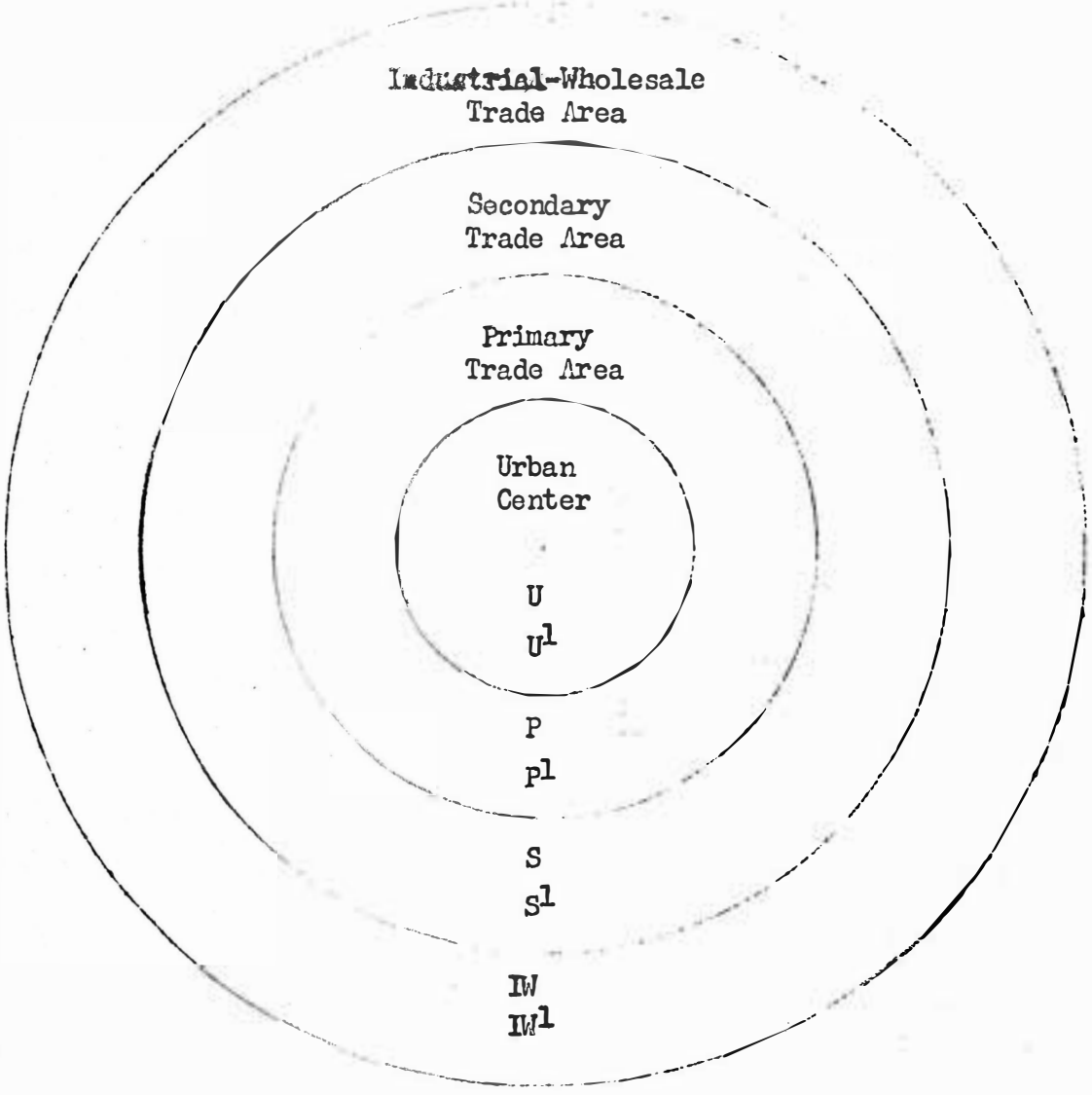
Finally the rural to urban ratio for the industrial-wholesale areas was estimated only from towns having all three types of trade areas - primary, secondary, and industrial-wholesale.

Rural to urban population ratios for each of these three groups were computed. For every person living in the primary area, approximately one person was living in the urban center; for every two persons living in the secondary area, one was living in urban centers having secondary trade areas; and for every five persons living in the industrial-wholesale rural areas, two were living in towns having industrial-wholesale trade areas. Thus the weighted primary rural to urban population ratio was approximately one to 1.0; the secondary one to 0.5 and for the industrial-wholesale it was one to 0.4.

After the above ratios were computed they were applied to the estimated increase in rural population in order that an approximation of urban population growth could be obtained. It was assumed that rural to urban population ratios would remain the same after irrigation as before.

The procedure used in determining urban population after irrigation is explained by using the following chart as an example of a shopping center having a primary, a secondary, and an industrial-wholesale trade area.

FIGURE 5. CHART EXEMPLIFYING A SHOPPING CENTER HAVING PRIMARY, SECONDARY AND INDUSTRIAL-WHOLESALE TRADE AREAS



The letters on the lower half of the above chart represent the following types of population in their respective trade areas:

U = urban population before irrigation (Bureau of Census).

U^1 = urban population after irrigation (to be determined).

P = primary rural population before irrigation (Bureau of Census Reports by Minor Civil Divisions).

(Figure 5 continued on next page.)

P^1 = primary rural population after irrigation (P + Bureau of Reclamation additional farm estimates x 3.8. The average size farm family in South Dakota = 3.8).

S = population in the secondary rural area before irrigation. (Bureau of Census by minor civil divisions.)

S^1 = population in the secondary rural area after irrigation (S + Bureau of Reclamation estimates of additional farms x 3.8).

IW = population of industrial-wholesale rural area before irrigation (Bureau of Census).

IW^1 = population of industrial-wholesale rural area after irrigation (IW + Bureau of Reclamation estimates of additional farms x 3.8).

From the available type of data above it is possible to set up a ratio formula to determine the urban population after irrigation development (U^1) for any particular town.

The following formulas have been set up to reflect the expected urban population of the towns having trade areas that are entirely included in the Oahe Unit, as well as the urban population of the trade centers where only a portion of their areas are located in the unit. As the rural population of a town's trade areas increase a relative increase in its urban population can be computed using the rural to urban trade area ratios. Thus towns like Aberdeen and Huron with only a portion of their trade areas located in the Oahe Unit will not realize as large a percentage increase in their population as those towns, the trade areas of which are located exclusively in the proposed unit.

For a shopping center having a primary, a secondary, and an industrial-wholesale area, the following formula can be applied:

$U^1 = U + [P, U \text{ ratio} \times (P^1 - P)] + [S, U \text{ ratio} \times (S^1 - S)] + [IW, U \text{ ratio} \times (IW^1 - IW)]$.

For a town having a primary and a secondary trade area, with no industrial-wholesale area the formula can be modified and applied thus:

$U^1 = U + [P, U \text{ ratio} \times (P^1 - P)] + [S, U \text{ ratio} \times (S^1 - S)]$.

And for a trade center with only a primary trade area the formula would merely be:

$U^1 = U + [P, U \text{ ratio} \times (P^1 - P)]$.

The application of the above formula will give a preliminary estimate of the urban population which may be expected after irrigation development in the rural trade areas of selected towns. To these preliminary estimates also must be added, the increase in urban population and the multiplying effect of this increase resulting from the establishment of new types of processing plants or other types of firms not in existence before development.

C. Applying the Trade Area Ratio Formula

The basic idea of the above trade area ratio formula was applied in estimating the urban population after irrigation for each town included in the Oahe Area. These estimates are prepared in Table II, pages 29 - 33.

Using Aberdeen as an example for demonstrating the application of the formula, one can trace the method for determining the increase in urban population as follows:

It can be noted that before irrigation the urban population was 21,051. To this must be added the primary rural to urban ratio factor, 1, multiplied by the additional rural primary population, 663. This product is 663. Also to be included is the product of the secondary rural-urban ratio 0.5, multiplied by the additional population of the secondary rural trade area, 3,064, which equals 1,532. And finally, one must also include the product derived by multiplying the industrial-wholesale-rural-urban ratio, 0.4, by the additional industrial-wholesale rural trade area population, 7,112. This amounts to 2,845.

Thus 21,051 + 663 + 1,532 + 2,845 = 26,091. This total, 26,091, is the estimated urban population of Aberdeen after irrigation based only on the ratios applied to the additional rural population. The increase in urban population as mentioned previously, due to new processing plant employment and the population multiplying effect expected therefrom, will be added to this total.

TABLE II. ESTIMATED RURAL AND URBAN POPULATION CHANGES BY TRADE AREA, DUE TO ADDITIONAL FARM POPULATION ANTICIPATED AFTER IRRIGATION DEVELOPMENT IN THE OAHE UNIT 1/

Towns Having Primary, Secondary and Industrial-Wholesale Trade Areas	Population Before Irrigation			Additional Farms From Irrigation Development 5/	Additional Population		Population After Irrigation	
	Urban 2/	Rural 3/	Trade Area 4/		Rural 6/	Urban 7/	Urban 8/	Trade Area 9/
Aberdeen (Total)	21,051					5,040	26,091	
Primary		4,200	25,251	173	663	663		30,954
Secondary		12,949	34,000	800	3,064	1,532		42,104
Ind. Whsle.		53,949	75,000	1,857	7,112	2,845		87,152
Huron (Total)	12,788					7,246	20,034	
Primary		2,700	15,488	413	1,582	1,582		24,316
Secondary		8,712	21,500	1,270	4,864	2,432		33,610
Ind. Whsle.		32,212	45,000	2,110	8,081	3,232		60,327
Towns Having Primary, Secondary Trade Areas								
Redfield (Total)	2,655					2,999	5,654	
Primary		1,100	3,755	343	1,314	1,314		8,068
Secondary		3,720	6,375	880	3,370	1,685		12,744
Miller (Total)	1,916					2,888	4,804	
Primary		2,270	4,186	500	1,915	1,915		8,989
Secondary		3,284	5,200	508	1,946	973		10,034
W. Springs (Total)	1,453					278	1,731	
Primary		2,450	3,903	45	172	172		4,353
Secondary		3,047	4,500	55	211	106		4,989
Ipswich (Total)	1,058					525	1,583	
Primary		1,258	2,316	110	421	421		3,262
Secondary		1,942	3,000	54	207	104		3,732

TABLE II (CONTINUED). ESTIMATED RURAL AND URBAN POPULATION CHANGES BY TRADE AREA, DUE TO ADDITIONAL FARM POPULATION ANTICIPATED AFTER IRRIGATION DEVELOPMENT IN THE OAHE UNIT 1/

Towns Having Primary and Secondary Trade Areas	Population Before Irrigation			Additional Farms From Irrigation Development 5/	Additional Population		Population After Irrigation	
	Urban 2/	Rural 3/	Trade Area 4/		Rural 6/	Urban 7/	Urban 8/	Trade Area 9/
Woonsocket (Total)	1,051					140	1,191	
Primary		1,363	2,414	23	88	88		2,642
Secondary		1,599	2,650	27	103	52		2,893
Faulkton (Total)	837					1,373	2,210	
Primary		1,078	1,915	172	659	659		3,947
Secondary		2,413	3,250	373	1,429	714		6,052
Towns Having Only Primary Trade Areas								
Wessington	467	925	1,392	335	1,283	1,283	1,750	3,958
Alpena	426	352	778	39	149	149	575	1,076
Wolsey	391	619	1,010	58	222	222	613	1,454
Frankfort	331	180	511	24	92	92	423	695
St. Lawrence	261	140	401	88	337	337	598	1,075
Mellette	250	435	685	146	559	559	809	1,803
Cresbard	235	393	628	245	938	938	1,173	2,504
Hitchcock	227	480	707	190	728	728	955	2,163
Ashton	222	300	522	51	195	195	417	912

TABLE II (CONTINUED). ESTIMATED RURAL AND URBAN POPULATION CHANGES BY TRADE AREA, DUE TO ADDITIONAL FARM POPULATION ANTICIPATED AFTER IRRIGATION DEVELOPMENT IN THE OAHE UNIT 1/

Towns Having Only Primary Trade Areas	Population Before Irrigation			Additional Farms From Irrigation Development 5/	Additional Population		Population After Irrigation	
	Urban 2/	Rural 3/	Trade Area 4/		Rural 6/	Urban 7/	Urban 8/	Trade Area 9/
Northville	220	400	620	109	417	417	637	1,454
Tulare	212	678	890	331	1,268	1,268	1,480	3,426
Orient	206	428	634	17	65	65	271	764
Stratford	164	140	304	3	11	11	175	326
Warner	150	240	390	128	490	490	640	1,370
Zell	150	60	210	4	15	15	165	240
Forestburg	150	260	410	3	11	11	161	432
Mansfield	150	130	280	34	130	130	280	540
Lane	145	160	305	30	115	115	260	535
Brentford	132	224	356	0	0	0	132	356
Bonilla	125	98	223	51	195	195	320	613
Virgil	124	216	340	18	69	69	193	478
Rockham	113	316	429	25	96	96	209	621
Vayland	108	32	140	107	410	410	518	960

TABLE II (CONTINUED). ESTIMATED RURAL AND URBAN POPULATION CHANGES BY TRADE AREA, DUE TO ADDITIONAL FARM POPULATION ANTICIPATED AFTER IRRIGATION DEVELOPMENT IN THE OAHE UNIT 1/

Towns Having Only Primary Trade Areas	Population Before Irrigation			Additional Farms From Irrigation	Additional Population		Population After Irrigation	
	Urban 2/	Rural 3/	Trade Area 4/	Development 5/	Rural 6/	Urban 7/	Urban 8/	Trade Area 9/
Athol	87	176	263	34	130	130	217	523
Broadland	74	64	138	30	115	115	189	368
Miranda	73	55	128	12	46	46	119	220
Chelsea	41	125	166	12	46	46	87	258
Mina	29	100	129	9	34	34	63	197
Burdette	8	52	60	45	172	172	180	404
Norbeck	7	41	48	0	0	0	7	48
Wecota	6	42	48	10	38	38	44	124
Total	48,093	24,280 10/	72,373 11/	3,967 10/	15,190 10/	28,865	76,958	116,428 11/

1/ These estimates only include the effect that an increase in rural population will have upon urban population growth. Additional population needed in connection with the operation of new types of processing plants or new types of retail service or wholesale firms, established because of irrigation, are not included in these estimates but taken into account in Table IV, p. 41.

2/ Bureau of Census Population Reports 1950 (preliminary estimates).

3/ Estimated from Bureau of Census Population Reports by Minor Civil Division 1950. Estimated for delineated trade areas.

4/ Urban population before irrigation (1/) plus rural population before irrigation (2/).

(Footnotes continued on next page.)

TABLE II (CONTINUED). ESTIMATED RURAL AND URBAN POPULATION CHANGES BY TRADE AREA, DUE TO ADDITIONAL FARM POPULATION ANTICIPATED AFTER IRRIGATION DEVELOPMENT IN THE OAHE UNIT 1/

5/ Bureau of Reclamation estimates obtained by dividing budget form sizes by land classes into irrigable land in each land class.

6/ Additional farms (4/) multiplied by 3.83 (estimated average number of persons per family in South Dakota, 1950).

7/ The total additional urban population of each town is the summation of the results obtained after applying the rural to urban trade area population ratios, to the estimated increase in rural population. All figures in this column other than the total for each town are estimates of number of inhabitants that each center may have as a result of the additional rural population in its respective trade areas. The ratio applied to these rural estimates were 1:1 for the primary; 1:5 for the secondary; and 1:4 for the industrial-wholesale trade area population.

8/ Total urban population before irrigation (1/) plus total additional urban population after irrigation (6/).

9/ Trade area population before irrigation (3/) plus total additional urban population (6/) plus additional rural population of each respective trade area (5/).

10/ Includes only rural primary population.

11/ Urban plus rural primary population.

CHAPTER V

ESTIMATING THE ADDITIONAL POPULATION NOT INDICATED THROUGH THE USE OF THE TRADE AREA RATIO FORMULA

A. New Industrial Employment

After the estimated total trade area population was obtained by using the pre-irrigation ratios, an estimate was made of the additional population that will be connected with new types of processing plants. The dryland ratio formula only reflects what population might be expected if the rural-urban population relationship after irrigation were the same as before.

The agricultural economy of the area in 1949 was predominantly grain farming and ranching, with the bulk of grain and livestock products being shipped to other areas for processing. With irrigation a more intensive type of agriculture can be expected. Many of the products grown under irrigation are the type adaptable for local processing. It is therefore assumed that a large portion of such processing will be carried on in the area.

Additional employment created from the establishment of new types of processing plants would thus tend to bring about a larger ratio of urban population to total population than existed before irrigation. Personnel associated with such firms as sugar beet plants, canning factories, and alfalfa dehydration plants therefore would not be reflected through the use of the ratios used and thus must be treated separately. A factor considered in estimating the number, size and location of these plants was the anticipated supply of raw materials that such plants require for operation. For instance, it was assumed

that alfalfa dehydration plants will be built in areas particularly adaptable to the growing of alfalfa. Land development studies were used as the basis for determining the quantity and quality of such land. 19/

Another factor taken into consideration was the typical scale of operation of similar types of plants in other irrigated areas, where the climate, seasons, soils, etc., are not significantly different from what may be expected in the Oahe Area.

For the purpose of simplification, part time employment was converted into what might be considered the full time equivalent. This was done by multiplying the number of seasonal employees by the percentage part of the year that was generally considered the seasonal operational period for a given type of plant.

Table III was prepared to show the estimated number, type and employment of processing plants based upon the above factors.

TABLE III. ESTIMATED NUMBER OF EMPLOYEES BY TYPES OF PROCESSING PLANTS, CONSIDERED FEASIBLE IN THE OAHE AREA AFTER IRRIGATION DEVELOPMENT 1/

Type of Plant	Number of Plants	Number of Employees of Plants 2/
Fluid Milk	3	24
Creameries	4	32
Milk drying plants	1	30
Sugar beet factories	2	300
Canning factories	1	340
Alfalfa dehydrating plants	8	148
Potato storage centers	30	217
Cold storage locker plants	6	12
Totals	55	1,103

1/ Estimated by the Bureau of Reclamation.
2/ Includes full time equivalent of part time help.

19/ These estimates of number, types, and employees of new processing plants were prepared by the Bureau of Reclamation with slight revisions in employee estimates due to the conversion of part time workers to the full time equivalent.

B. Population Multiplying Effect Induced by New Industrial Employment

As the processing plant employees become established in the area one can expect that the income which they spend for goods and services will give rise to an additional group of firm employees to provide such goods and services. This additional segment of firm employees will in turn become customers which again will necessitate greater employment. Thus it can be expected that the employment of the new types of processing plants, because of their expenditures, creates a multiplying effect on the number of additional employees.

An attempt to determine the extent of this population multiplying effect has been made by estimating the expendable income of the employees and the effect that such expenditures have on employment.

An assumption was made that the average processing plant employee would spend approximately $2,800 per year. 20/ It was estimated that the employees of new processing plants would number 1,103. (Table III.) Thus the total expendable income of the employees of the processing plants would be approximately $3,088,400. A further assumption was that this total expenditure will be for the same types of goods and services as the goods and services purchased in 1950, or under the pre-irrigation economy, with the following exceptions: purchases of agricultural goods or services, construction equipment, and wholesale and

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20/ This income was based upon the United States average annual earnings, $2,865, per full time industrial employee in 1949 as reported by the Department of Commerce in Survey of Current Business, July, 1950, table 26, p. 22. The sum of sixty-five dollars was subtracted from the $2,865 as the estimated amount that would be spent on direct taxes and withheld in the form of savings.

industrial items probably would not be made directly by the additional employees or their families.

From data gathered in the Oahe Area in 1950, an employee to total volume of business relationship was computed. It was found that an 84,645,089 dollar volume of business was transacted with 5,512 full time and 1,042 part time employees. 21/ If this relationship holds true after irrigation, an estimated additional expenditure of $3,088,400 would necessitate an increase of 198 full time and 38 part time employees. 22/ Converting the part time employment into the full time equivalent an estimated 210 full time employees would be needed as a result of the expenditures of the processing plant employees. 23/

Thus far then, it has been estimated that 210 additional employees will be needed to serve the 1,103 processing plant employees. Likewise, if the same proportional number of persons are needed to serve the 210 as the 1,103 processing plant employees, 40 additional workers can be expected. These 40 employees would in turn require the services of eight workers and finally the eight may be served by only two. 24/

In summary then, the total multiplying effect on population, resulting from the expenditures of the processing plant employees and subsequent workers, would give an estimated total additional employee figure of 1,363. (1,103 + 210 + 40 + 8 + 2.)

21/ Thompson, John, op. cit. p. 55.

22/ $\frac{3,008,440}{84,645,089} = 3.6\% \times \begin{matrix}(5,512 = 198 \text{ full time}) \\ (1,042 = 38 \text{ part time})\end{matrix}$

23/ It was assumed that three part time workers would spend the equivalent of one full time employee. Thus 198 full time plus (1/3 of 38 part time) or 12.7 = approximately 210 full time employees.

24/ This is a multiplying reducing factor of 19 per cent.

As was stated earlier, employee expenditures would probably not be made for agricultural goods or services, construction equipment, or wholesale or industrial items. Indirectly, however, a significant increase in industrial and wholesale purchases can be expected as retail sales increase due to the purchases by the additional employees considered above. Many of the large industrial and wholesale suppliers are located outside of the Oahe Area, thus only a portion of the additional retail purchases would increase the business volume of such firms in the Oahe Unit. Possibly the most significant wholesale purchases will be in food purchases. In 1950 almost all of the groceries purchased by retailers were supplied by wholesale food distributors located in the Oahe Area.

An estimate of the additional employees needed in the wholesale grocery distribution, as a result of this segment of employees, was arrived at in the following manner. The total estimated earnings of the 1,363 employees at $2,800 per year is $3,816,400. Of this total, it is estimated that 20.7 per cent will be spent for groceries 25/ or approximately $800,000 will find its way to wholesale grocers (allowances being made for retail markups). From data gathered in the Oahe Area it was found that for approximately $33,000 of wholesale business transacted, one person was employed in wholesale firms. Again, if this same relationship exists after irrigation development, one can expect that an extra 25 wholesale employees will be needed as a result of the above increase of $800,000 in wholesale grocery business ($800,000 divided by 33,000).

25/ Per cent of total per capita consumer expenditures for groceries in the United States in 1949, Chamber of Commerce of the U. S., Domestic Distribution Department, Distribution Newsletter No. 15, October 16, 1950, p. 6.

Other wholesale and industrial establishments in the area will also undoubtedly be effected by the expenditures of these extra employees, but to a lesser degree than the wholesale grocers. Two reasons account for this thinking. One is that the trade area of many of the industrial and wholesale firms extends far beyond the limits of the Oahe Area in many cases. Thus the impact of only a small per cent of the income of 1,363 employees on the total operation of such firms would be relatively slight. Also as was previously mentioned, many of the industrial and wholesale firms handled items not commonly purchased by employees of firms. Thus, for these reasons, it is assumed that the number of additional employees for the industrial and wholesale firms, other than the wholesale grocery employees, will be less than the 25 estimated for grocery wholesalers.

Finally, adding the 1,363 employees, the 25 wholesale grocery employees and less than 25 for other industrial wholesale employees, a total of approximately 1,400 employees is obtained. This estimate then is the result of the direct and indirect effect of the additional processing plant personnel on total employment.

The total increase in trade area population from the 1,400 employees was estimated by multiplying this number by an assumed family size of 3.2. 26/ This total population, 4,480, resulting from the establishment of the new plants can then be added to the trade area population estimated from the trade area ratio formula giving a total estimated trade area population of the Oahe Area after irrigation of 120,908. (116,428 + 4,480)

26/ The family size of 3.2 was based on number of urban persons per households of all ages in the United States in 1951, U. S. Census of population. It was also assumed that there would be one household for every full time employee.

CHAPTER VI

COMMERCIAL EXPANSION

A. Dollar Volume Increase

In the preceding chapters almost all the emphasis was placed on estimating the increase in population of the Oahe Area as a result of irrigation. This was done in the belief that from such an estimate it would be possible to approximate the additional dollar volume of business that might be expected after the area is developed. This again is contingent upon on several assumptions. One assumption is that there is a direct relationship between the number of inhabitants in the trade areas of a given town or group of towns and the dollar volume of business transacted in these towns, and that this relationship will not change with irrigation development. Another assumption is that the buying pattern of the customers of the firms in the area will not change significantly after irrigation is introduced in the area.

From data gathered of the pre-irrigation economy 72,373 inhabitants were counted living in the primary trade areas of the towns of the Oahe Area. A business volume of $161,469,342 was calculated for selected firms within these towns. This is an average of $2,231.07 per person in the trade areas. Then if the increase in trade area population as a result of irrigation is 48,535, as was estimated in the previous two chapters, the total increase in dollar volume of business may be expected to be $108,284,870. This is an approximate increase of 67 per cent in trade area population as well as dollar volume of business in

the area. (Table IV)

TABLE IV. ESTIMATED INCREASE IN POPULATION AND VOLUME OF BUSINESS TRANSACTED RESULTING FROM IRRIGATION DEVELOPMENT IN THE OAHE UNIT

	Before Irrigation	After Irrigation	Increase
Total Population (Oahe Unit)	72,373	120,908	48,535
Dollar Volume of Business *	$161,469,342	$269,754,212	$108,284,870

* Estimates are for selected businesses in towns of the Oahe Area.

B. Economic Effects Resulting from an Increase in Population and Volume of Business Transacted

To determine just what effect the dollar increase in business volume would have on the commercial economy such as on the number, types or quality of firms in the area is highly speculative. One can look to other irrigated areas and observe what has transpired, but even then it is impossible to know just what part irrigation has played in bringing about the changes. A proposition that does seem logical is that the towns having the greatest percentage increase in their trade area population, as a result of irrigation development, will enjoy the largest relative increase in commercial expansion. Table II, pages 29-33, might be used as an indication of the commercial growth of each town if it expands in relation to the increase in population of its trade areas. The percentage increase in trade area population or increase in dollar volume might be applied to the commercial activity of a selected town in several ways. The additional dollar volume may be absorbed by the established firms of a town, or new business establishments may be built to handle the increased trade. Allocation of the total estimated increased

volume to the various towns and firms within a town can be accomplished in accordance with the relative change in each town's trade area population. Transportation improvements may however alter the trade area boundaries favoring the larger trade centers at the expense of the smaller towns.

CHAPTER VII

SUMMARY AND CONCLUSIONS

The objective of this study is to estimate the commercial expansion from irrigation development of the Oahe Unit. Such estimates can only be made under certain simplifying assumptions because of the many dynamic factors associated with irrigation and influencing economic growth.

A. Method of Procedure

Several economic factors such as the spending pattern of consumers, family income and expenditure, and average size of family were assumed to be the same after irrigation development as before. It was also assumed that the general economic level of living would remain as it was in 1950. Adjustments to the preliminary estimates can be made in accordance with one's views on the impact that such factors may have on the considered economy.

In order to arrive at the extent of commercial expansion, estimates of future population were made. As more people settle in the irrigated areas of the Oahe Unit, total income can be expected to increase stimulating business activity. It was assumed that the relationship between population and business activity would be the same after irrigation development as before. Thus, after the increase in farm population

resulting from irrigation was determined it was possible to estimate the amount of business activity expected from the economic change.

The procedure used in estimating the number of inhabitants in the Oahe Area, after irrigation development, was to compute rural to urban population ratios from the existing economy in 1950, and apply such ratios to the estimated rural population expected from irrigation. The estimated rural population after development was based upon the expected number of farms in the area. These farm estimates were prepared from farm budget studies carried on by the Economics and Repayment Section, Bureau of Reclamation District Office, Huron, South Dakota.

In order to compute rural to urban population ratios it was necessary to delineate trade areas for each town, so that the number of customers patronizing each town, and extent of customer patronage, could be determined. These trade areas were delineated using primarily the population of the trade centers, the distances between the towns and the types of firms in each town as determining factors.

After the population of the proposed irrigation area was estimated from the population ratios, necessary adjustments were made of these estimates taking into consideration the employment that can be expected from the new types of industrial activity and the population multiplying effect that such employment has on additional workers.

The total population after irrigation was thus estimated and the percentage increase in population was multiplied by the pre-irrigation business volume to determine the additional volume. The product of this computation is the commercial expansion that may be expected as a result of irrigation in the Oahe Unit under the assumptions used.

Pro-rating this additional business volume to the towns, or firms within the towns, can be accomplished in accordance with the relative changes in trade area population. However, other economic influences such as transportation facilities, new inventions, innovations, and changes in social values should be considered in such an allocation procedure.

B. Application of Method to Other Areas

In devising a method for estimating commercial expansion resulting from irrigation development of the Oahe Unit, the possible use of the techniques in other areas was considered.

The type of area where the method devised in this study should be most applicable would be one having an established farming and business community. The techniques used in this study were designed to show the commercial effects resulting from conversion of a developed dryland agricultural economy, to an irrigated and dryland economy.

More adjustments in the method would be necessary in estimating commercial effects from irrigation for an undeveloped area, than in one where the agricultural economy has already been established.

APPENDIX A

TABLES I AND II

TABLE I. THE DOLLAR VOLUME OF BUSINESS BEFORE AND AFTER PROPOSED IRRIGATION DEVELOPMENT BY TYPES OF BUSINESS FIRMS IN THE OAHE UNIT

Type of Business	Volume of Business	
	1949	Estimates After Development
Total	$161,469,342	$269,754,212
Grocery & Related Services	14,150,208	23,639,703
Eating & Drinking	6,217,929	10,387,834
General Merchandise	11,413,119	19,067,051
Apparel	4,523,697	7,557,405
Furniture, Appliances	3,085,384	5,154,522
Automotive	15,084,459	25,200,487
Lumber, Hardware	6,745,163	11,268,644
Drug and Drug Sundries	1,678,062	2,803,414
Second Hand Stores	237,000	395,938
Machinery & Heavy Equipment	7,914,608	13,222,348
Agricultural	24,043,531	40,167,744
Other Retail	5,120,135	8,553,329
Personal Service	2,536,340	4,237,275
Business Services	9,945,945	16,615,953
Transportation Service	2,315,000	3,867,498
Repair Service	1,592,648	2,660,077
Wholesale	38,103,911	63,657,379
Industrial	6,762,203	11,297,111

TABLE II. TYPES OF BUSINESS ESTABLISHMENTS TYPICALLY CLASSIFIED IN THE PRIMARY, SECONDARY, AND INDUSTRIAL-WHOLESALE GROUPS

Primary Group

Barber Shops
Beauty Shops
Beer Parlors & Bars
Blacksmith, Machine Shops, Welding & Generator Repair
Candy, Nut, Confectionery Stores
Cigar Stores, Smokers Supplies & News Stands
Department Stores, General Merchandise Stores & Dry Goods
Drug Stores
Drug Store Sundries & Home Remedies
Fruit, Vegetable Markets
Funeral Directors
Garages, Repair Shops, & Body Shops
Gas Stations
Gift, Novelty, Books & Stationery Stores
Grocery Stores
Ice Cream Stores
Laundries & Laundromats
Liquor Stores
Lunch Rooms & Refreshment Stands
Meat Markets
Pool Halls, Bowling Alleys, Club Rooms, & Dance Halls
Restaurants & Cafeterias
Shoe Repair & Shoe Shine

Secondary Group

Adjustment & Credit Companies, Collection Agencies
Air Conditioning, Heating, Sheet Metal Service
Appliance Stores
Auto Sales & Truck Sales
Banks
Building Materials
Car Accessories
Cement
Children's Clothing Stores
Cleaning, Dyeing, Pressing & Alterations
Coal, Wood, Fuel
Dairy & Dairy Products
Electrical Equipment
Electrical Wiring
Farm Implements, All Machinery
Federal Financial Establishments
Floor Covering, Sewing Machines, Vacuum Cleaners & Other Home Furnishings

TABLE II (CONTINUED). TYPES OF BUSINESS ESTABLISHMENTS TYPICALLY CLASSIFIED IN THE PRIMARY, SECONDARY, AND INDUSTRIAL-WHOLESALE GROUPS

Secondary Group

Flour, Feed, Seed Establishments
Frozen Food Lockers & Meat Processing
Furniture
Furniture Repair
Furriers, Fur Shops
General Apparel Stores
Grain Elevators
Hardware
Hatcheries
Insulation & Lightening Rods
Jewelry Repair
Jewelry Stores
Job Printing
Livestock Auctions
Locksmith
Luggage, Leather Goods, Harness Shops
Lumber, & Wood Products
Men's Clothing
Millinery Stores
Office Equipment, Stationery & Supplies
Paint, Glass & Wallpaper
Plumbing, Sheet Metal, Heating & Air Conditioning Equipment
Printing, Publishing & Book Binding
Produce Creameries & Cream Buying
Radiator Repair
Radio Repair
Radio Sales
Shoe & Boot Stores
Sporting Goods
Theaters
Tire Repair
Variety Stores
Well Digging
Women's Clothing

Industrial-Wholesale Group

Bakeries & Bakery Products
Bottling Companies
Building & Contractors, Cement & Tools
Florists
Foundries
Ice Manufacturers
Miscellaneous

TABLE II (CONTINUED). TYPES OF BUSINESS ESTABLISHMENTS TYPICALLY CLASSIFIED IN THE PRIMARY, SECONDARY, AND INDUSTRIAL-WHOLESALE GROUPS

Industrial-Wholesale Group

Photographic Studios
Stone, Clay, Sand, Gravel Products
Water Softeners
Woodworking, Clay & Plaster

Automotive Stores
Barbers Supplies
Beer & Beverage Distributors
Bulk Oil Stations & Propane Gas Companies
Confectionery
Dairy Products
Electrical Equipment Stores
Hardware, Implements, Paint & Glass
Heating & Plumbing
Office & School Supplies
Radio Supplies
Sporting Goods
Tires
Welding Equipment
Wholesale Food Distributors
Wood Products

APPENDIX B

SAMPLE OF SCHEDULES USED

RETAIL, WHOLESALE, AND SERVICE SCHEDULE

Confidential

Town _____ Code No. _____

I. Name of business _____

Type of business _____

II. Employees including management-Full time(40 hrs.)____Part time ____

III. Goods handled

Type of Goods	Source of Goods (Town)	Per cent	Transportation Used Rail-% Truck-%	Approximate Annual Volume of Goods Sold
1. _____	_____	_____	_____	_____
	_____	_____	_____	
	_____	_____	_____	
2. _____	_____	_____	_____	_____
	_____	_____	_____	
	_____	_____	_____	
3. _____	_____	_____	_____	_____
	_____	_____	_____	
	_____	_____	_____	

IV. Services Performed

Type of Service	Approximate Dollar Volume from Type of Service
_____	_____
_____	_____

Approximate total volume of business _____ Total Services _____

V. Is Transportation Adequate Rail _____ Truck _____

If not, why _____

VI. Approximate trade area in miles -- N___S___E___W___ City Only ____

VII. Comments (Changes Contemplated, etc.)

INDUSTRIAL ESTABLISHMENT SCHEDULE

Confidential

I. Location _____

Name of Plant _____ Code No. _____

Type of Plant _____

II. Chief Kinds of Good Manufactured

Goods	Total Volume Produced	Sales Volume ($)	Destination of Goods (City)	Transportation Used Rail-%	Truck-%

III. Principal Kinds of Material Used

Material	Source of Materials (City)	Transportation Used Rail-%	Truck-%

IV. Adequacy of Transportation Used

Rail-% _____ Adequate _____ Inadequate _____

Truck-% _____ Adequate _____ Inadequate _____

V. Employees Including Management

Full time (40 hrs.) _____

Part time _____

VI. Comments (Contemplated Changes, etc.)

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